

CLAIMS

1. A spectral calibration device comprising:
a first layer comprising an optical scattering material; and
a second layer comprising a fluorescent agent that emits radiation
5 when subjected to an energy source,

wherein fluorescence emitted from said device provides calibration
information for a spectral measurement system.

2. The device of claim 1 wherein the optical scattering material
comprises particles.

10 3. The device of claim 2 wherein the particles comprise barium sulfate

4. The device of claim 2 wherein optical scattering of said optical
scattering material can be varied by altering particle size.

15 5. The device of claim 1 wherein optical scattering of said optical
scattering material is similar to optical scattering of a target of said spectral
measurement system.

6. The device of claim 5 wherein the target is skin.

7. The device of claim 1 wherein the radiation emitted by the device is
between about 200 nm and about 800 nm.

20 8. The device of claim 1 wherein the radiation emitted by the device is
between about 300 nm and about 500 nm.

9. The device of claim 1 wherein the energy source is visible light.

10. The device of claim 1 wherein the fluorophore is photochemically-
stable.

25 11. The device of claim 10 wherein the photochemically stable
fluorophore is a fluorophore that emits an amount of radiation when exposed to a

constant energy source wherein said amount does not vary by more than five percent after at least 250 exposures to said source.

12. The device of claim 10 wherein the photochemically stable fluorophore is an inorganic phosphor.

5 13. The device of claim 1 wherein the first layer is proximal to said energy source and the second layer is distal to said energy source, such that radiation passes through said first layer before reaching the agent.

14. The device of claim 1 wherein the spectral measurement system provides a glucose level determination for a patient.

10 15. A method of calibrating a spectral measurement comprising:
directing excitation radiation to a calibration device comprising at least one optical scattering layer and at least one other layer containing at least one fluorophore, wherein optical radiation emitted from said device provides calibration information;

15 collecting spectral radiation emitted from the device; and
calibrating the spectral measurement with the calibration information collected.

16. The method of claim 15 wherein the spectral measurement is fluorescence.

20 17. The method of claim 15 wherein the spectral measurement is indicative of a glucose level of a patient.

18. The method of claim 15 wherein the excitation radiation comprises visible light.

25 19. The method of claim 15 wherein the scattering layer comprises particles of barium sulfate.

20. The method of claim 15 wherein the fluorophore comprises a photochemically stable inorganic phosphor.

21. The method of claim 15 wherein the spectral radiation emitted is between about 200 nm and 800 nm.

5 22. The method of claim 15 wherein the spectral radiation emitted is between about 300 nm and 500 nm.

23. The method of claim 15 wherein the emitted radiation is collected with a CCD camera.

10 24. The method of claim 15 wherein the calibration information is determined from the amount of radiation detected from the fluorophore.

25. A method of calibrating a fluorescence measurement comprising:
selecting a calibration target on a fluorescence measuring instrument;
exciting the calibration target with modulated electromagnetic
radiation;
15 detecting spectral radiation emitted from the calibration target; and
demodulating the spectral radiation detected to generate a difference
signal that is indicative of a phase shift between the modulated electromagnetic
radiation and the spectral radiation emitted from the calibration target.

20 26. The method of claim 25 wherein the calibration target is selected from the group consisting of tissues of arteries, bladder, blood, brain, breast, capillary beds, cervix, colon, cornea, eye retina, gastrointestinal tract, gynecological tract, hair, heart, intestines, kidney, liver, lung, muscle, ovary, prostate, retinal blood vessel, skin, stomach, tumor, veins, and combinations thereof

25 27. A method of correcting for drift of an optical instrument comprising:
directing excitation radiation to a calibration device comprising at
least one scattering layer and at least one other layer that contains a fluorophore;

collecting emitted radiation from the device and determining a correction signal; and

calibrating the optical instrument from the correction signal.

28. A device for calibrating a glucose level detection instrument comprising an outer layer containing an optically scattering material and an inner layer comprising a fluorophore, wherein visible radiation emitted through said outer layer impacts said fluorophore which thereby fluoresces and provides a calibration correction measurement to the glucose level detection instrument which provides an accurate glucose level determination for a patient.